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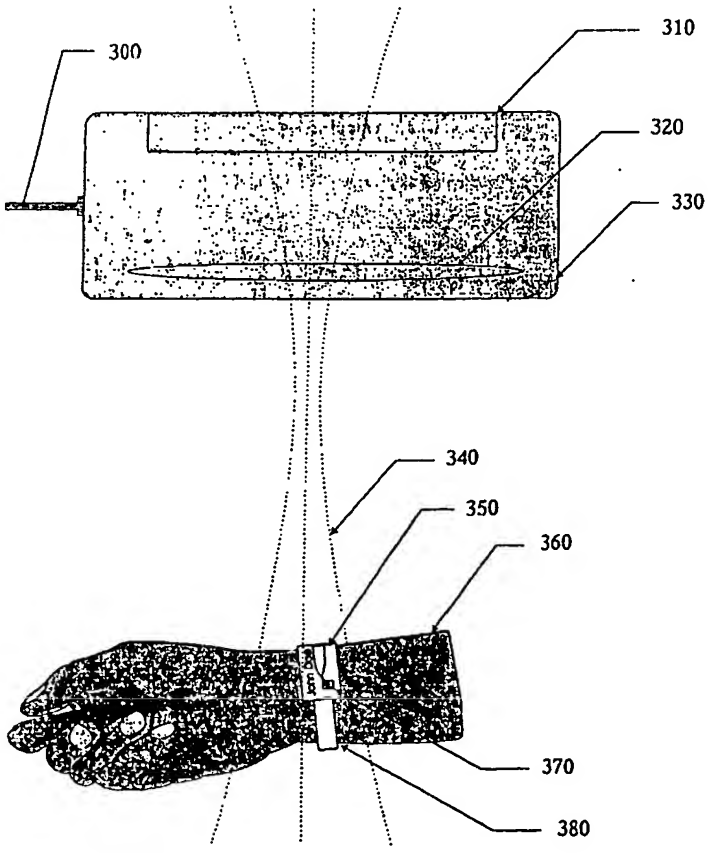
(54) Title: A SYSTEM FOR NON-CONTACT IDENTIFICATION AND RETRIEVAL OF AN INDIVIDUALS PERSONAL INFORMATION



(57) Abstract: The present invention provides a system comprising a plurality of radio frequency identification (RFID) tags (350), a scanning device (330) and an information database for the identification and subsequent retrieval of personal records of an individual. The RFID tags contain identification circuitry (370) designed in a passive configuration and are incorporated into a system adapted for the identification of individuals and the retrieval of personal information within various environments. A security protocol exists between the RFID tags, the scanning device, and the information database in which a security barrier is created in order to protect confidential information.

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European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

FIELD OF THE INVENTION

The present invention pertains to the field of wireless communication systems

BACKGROUND

Identification devices, such as wristbands or the like, are widely used in hospitals or in crowd control situations, such as concerts, amusement parks, or the like, to identify patients or individuals and provide information regarding patients or individuals. In addition, such identification devices may be utilised in penal and similar institutions for the purpose of inmate control.

Initially, such wristbands were limited to providing the bare minimum of the patient's name and, possibly, the patient's illness, with this information being printed on said bands. In crowd control situations, the wristband is utilised to indicate the admissibility of an individual wearing the band and frequently the possible duration of the attendance period of the person wearing the band, which could be accomplished by colour coding. This identification method leads to the possibility of human error due to poor light conditions or concealing of the information by foreign material. Furthermore, contact with the individual to be identified may be necessary to correctly view the wristband.

Identification wristbands have also been provided with encoded information in the form of bar codes or the like whereby considerable additional information about the individual wearing the wristband can be ascertained, including, in the case of a hospital patient, relevant data such as medication, the patient's condition, or the like. In crowd control situations, the wristbands can be utilised to provide such data as the amount of money or payments unexpended by the individual wearing the wristband. Thus, in amusement parks or the like, the wristband, by the use of encoded information, can control the admission of the individual wearing the band to specific attractions. The main problem with this method is that direct visualisation of the of the code is required for accurate scanning. As with the imprinted bands foreign material could obscure the view of the bar code and contact with the individual to be scanning may be required.

A solution which would overcome the aforementioned limitations of identification wristbands which are bar-coded or provided with similar encoded imprinted material would be to provide a radio frequency (RF) circuit in the wristband which would incorporate a semi-conductor circuit with logic, memory, and an RF circuit connected to an antenna capable of storing and dispensing information so that a staff member carrying a transponder could query the RF circuit of the

wristband to elicit a wide spectrum of information not presently available in conventional wristbands.

A possible configuration of a radio frequency identification (RFID) tag in the form of a wrist band is given in U.S. Patent No.5,973,600 and illustrated in Figures 1 and 2. The RFID circuit **10** is attached to a intermediate laminae **20**, which is then sandwiched between the top and bottom laminae, **30** and **40** respectively, to secure the RFID circuit in position. This band can be attached to an individual using a range of methods, for example inserting a clip into holes pre-formed within the band resulting in a closed loop.

It is well known to those skilled in the art that radio frequency identification (RFID) circuitry of this type can exist in a variety of configurations; for example, read only, read/write, passive, and active. The read only configuration provides previously installed information from the RFID circuit through a compatible reader. The read/write circuit permits the reader to install or alter information stored in the circuit. The passive circuit is one which depends upon the signal emitted by the reader for activation and operating power while the active circuit includes a battery or other internal power source which may be activated by the signal from the reader.

U.S. Patent No. 5,973,600 describes a method of the assemblage of a RFID circuit. Figure 3 illustrates the construction of a bi-laminae wristband wherein an upper lamina **130** of sheet plastic material is drawn from a dispensing roll **110** between circuit-imprinting means **150** and a back-up roll **140**. The circuit-imprinting means **150** may be composed of a plurality of different imprinting devices, which result in the formation of a complete circuit. The RFID circuit (not shown) is printed on the underside **120** of the upper lamina **130** and the upper lamina **130** is fed to a laminating station **180** where it is adhesively or otherwise fastened to the lower lamina **190** drawn from a dispensing roll **160**. A back-up roll **190** supports the assemblage during the final fabrication of the wristband **100**. This process could also be altered slightly to produce a tri-laminae wristband, with the circuitry being imprinted on the middle laminae.

When using an active RFID tag, accurate determination of the individual being scanned is difficult due to the long-range transmission of said tag. If for example, one individual is being scanned, the information from another individual located nearby may be received instead. This could result in a serious error, for example, adding one individual's personal data to another or even more problematic, overwriting one individual's personal information with another's. Furthermore, since these devices are active, they require battery power to function and this power source could fail or be depleted if frequently used. By using a passive RFID tag these problems

are eliminated. These passive tags are powered by an electromagnetic field that is generated by the scanning device.

Smart cards, which are the size of a credit card and are passive devices, have also been used for individual identification. These devices need to be powered by direct contact in order for the information contained on the card to be transmitted. Thus these smart cards could be contaminated by foreign material, which could get into the contacts of the reading device and cause them to malfunction and furthermore contact with the patient is also required.

Each of the above examples illustrates a method of identification of an individual, however only the information imprinted on and/or contained within the circuitry, of the identification tags is available to the person seeking the information.

Within a hospital setting, correct and safe identification of a patient along with the quick retrieval of relevant patient information results in the efficient and effective use of hospital staff.

By using a passive radio frequency identification (RFID) tag for the correct and non-contact identification of an individual, with an efficient and secure method of transferring the correct information pertaining to the identified individual, it should be possible to improve work efficiency.

This background information is provided for the purpose of making known information believed by the applicant to be of possible relevance to the present invention. No admission is necessarily intended, nor should be construed, that any of the preceding information constitutes prior art against the present invention.

SUMMARY OF THE INVENTION

An object of the present invention is to provide a system for non-contact identification and retrieval of an individual's personal information . In accordance with an aspect of the present invention, there is provided a system for identifying and retrieving information about an individual comprising: a plurality of RFID tags, wherein each tag corresponds to one individual,

a scanning device, and an information database wherein said identification of an individual is possible by non-contact means.

BRIEF DESCRIPTION OF THE FIGURES

Figure 1 shows a plan view of a possible configuration of a RFID tag.

Figure 2 shows a elevation view of a possible configuration of a RFID tag.

Figure 3 shows a possible manufacturing procedure for a RFID tag.

Figure 4 shows a plan view of a possible RFID tag.

Figure 5 is a side view of a scanning device and a RFID tag attached to a person.

Figure 6 illustrates the logic diagram for the retrieval of an individual's personal information from a secure database.

DETAILED DESCRIPTION OF THE INVENTION

Definitions

Unless defined otherwise, all technical and scientific terms used herein have the same meaning as commonly understood by one of ordinary skill in the art to which this invention belongs.

The present invention provides a system comprising a plurality of radio frequency identification (RFID) tags, a scanning device and an information database for the identification and subsequent retrieval of personal records of an individual. The RFID tag incorporates identification circuitry designed in a passive configuration and is incorporated into a system adapted for the identification of individuals and the retrieval of personal information within various environments. A security protocol exists between the RFID tag, the scanning device, and the

information database in which a security barrier is created in order to protect confidential information.

This system of non-contact identification and data retrieval comprises three main components, however the system is not limited to just these elements. The main components of this system are: 1) a radio frequency identification (RFID) tag; 2) a scanning device and; 3) an information database.

Radio Frequency Identification (RFID) Tag

The design of a passive read only or read/write RFID tag is well known to someone skilled in the art and the construction of such a device in the form of a band is presented in the background of the invention and illustrated in Figure 2.

A possible configuration of passive RFID tag in the form of a wristband is shown in Figure 4. There is a clip **200** that is inserted into holes **210** that will provide attachment of the band **220** to an individual. The coil **230** and the chip **240** are placed within the band **220** and protected from contamination by a protective material layer. The outer surface of the band **250** could also be composed of a printable material or allow for the placement of a label, to provide a method of visual identification of said individual also.

A coil **230** contained within a RFID tag will generate a current in the presence of a magnetic field generated by an external source, and said current provides power to a chip **240**, which contains circuitry such that information can be stored thereon. This information consists of a unique identification number and possibly additional information. This additional information can be, for example, the individual's name, date of birth and age. The presence of additional information is dependent on the design of the circuitry the chip, for example, read only or read/write.

It would be readily apparent to a worker skilled in the art that the unique identification number can be generated using a variety of methods. In one embodiment of the present invention, the unique identification number, which is contained within the chip, can take the form of 156 bit number. The generation of this unique identification number can be compared with, for example, a Universal Unique Identification (UUID) which is a unique identifier based on the location and time of its generation as described in the IEEE 1451.2 Standard. This identification number is associated with an individual's personal information, which can be contained on an

information database, thus allowing for the retrieval of said individual's personal information. In one embodiment of the present invention, the retrieval of an individual's personal information follows a security protocol that ensures privacy and confidentiality.

The transmission distance of a RFID tag can be between 3 and 6 inches, however this distance can vary depending on, for example, the size of the coils, current and the charge of the inductor.

Scanning Device

The system of the present invention further comprises a scanning device that produces a magnetic field (for example, by passing an oscillating current through a coil) which can activate a passive RFID circuit contained within the aforementioned tag. This coil, or another coil contained within the scanning device will act as an antenna capable of receiving the information transmitted by the RFID tag, which is being scanned.

This scanning device has the capability of connection to a network, which contains an information database that contains a complete set of all of personal information of all the individuals within a particular environment. This connection method could be via a cabled network, but a preferred embodiment enables wireless connection to said network, which would allow for more mobility of a scanning device from individual to individual and from location to location.

Furthermore, this scanning device will have the capability of displaying information received from a RFID tag, upon scanning said tag and/or information transmitted from the information database to said scanning device. This display can take the form of a CRT screen or a LCD display screen, for example.

Furthermore, a form of authorisation is required for the use of a scanning device, thus restricting use of this device to registered personnel. The authorisation of use of a scanning device can be performed by, for example, the input of a password or a fingerprint scan etc.

Information Database

This information database performs a plurality of tasks, including for example, preventing unauthorised use of the information database, correlating a unique identification number from a RFID tag with the correct individual information, and storage of all said individual information.

Access to the information database can be authorised only if the unique identification number is recognised. The uniqueness of this identification number and the authorisation of the user of the scanning device, provide a level of security for all information contained within this information database.

In one embodiment of the present invention, the correlation of the unique identification number with the personal information of the individual being scanned can be performed using an index lookup table. This index lookup table would allow the identification of an individual's permanent identification code, with the temporary unique identification number contained within the RFID tag. This interconnection between the unique identification number and a permanent identification code of a individual allows for the reassignment of the RFID tag to another individual and/or the assignment of a new RFID tag to the same individual. Once correlation between the unique identification number and an individual's personal information is completed, this information can be located within the information database and transmitted over a network to the scanning device requesting the information.

Integration of these Components to from a System

The integration of these components creates a system capable of non-contact identification of an individual and the retrieval of said individual's personal information, which can be implemented in the following manner.

An individual within a particular environment is supplied with a passive RFID tag for identification purposes. This tag can be in the form of a wristband or other configuration, such that the tag remains on the individual; for example, it is not connected to anything that can be removed from the person. The outer surface of the tag can be composed of printable material (or a material that allows for the sticking of an adhesive label) so that visual identification data can also be included on the tag. The circuitry of this RFID tag can be of a read only format and thus would contain a unique identification number, or of a read/write format allowing for information about the individual to be included in the RFID tag along with the unique identification number. This additional information can be, for example the date of birth of the individual or other frequently used personal information about said individual. The unique identification number, which can take the form of a 156 bit number for example, would allow for the identification of an individual in a plurality of environments.

The non-contact identification of an individual wearing a RFID tag is illustrated in Figure 5. The scanning device **330** generates a magnetic field **340** (by an oscillating current through a coil **320** contained within the scanning device). This magnetic field is received by a coil within the RFID tag **350**, resulting in a weak current being generated. The distance between the scanning device's coil **320** and the RFID tag's coil **350** is variable (depending on coil size, current, and the Q of the inductor). This generated current powers the RFID tag chip **370**, which sends, for example, a 156 bit unique identification number to the scanning device **330** and this information is presented on the display screen of the scanning device **310**. This unique identification number is not limited to this form but can be generated from a plurality of combinations and permutations. Additional information can also be transmitted, if the RFID tag **380** is of a read/write format, which would allow for information, directly related to the individual, to be programmed onto the RFID tag **380**. This transmission of information is accomplished by the generation of a weak magnetic field within the RFID tag **380**, by passing the data through a coil within said tag **350**. The scanning device's coil **320** is used as an antenna to pick up the information sent by the RFID tag **380**. This information includes a unique identification code and could also include additional information, depending on the design of the circuitry RFID tag **380**.

The procedure of retrieving the complete history of the individual is illustrated in Figure 6. Once the scanning device has received the unique identification number from the RFID tag **420**, the scanning device transmits this unique identification number to an information database **430**, which contains a complete list of all of the individuals within the environment. This transmission of the unique identification number could occur over a cabled network but a preferable embodiment provides transmission over a wireless system allowing for more mobility of the scanning device. Authorisation for access to the information database will only be granted if the unique identification number is recognised **440**.

Once the unique identification number is verified, the scanning device will gain access to the information database, which contains an index lookup table **450**. All unique identification numbers assigned to RFID tags are located within this index lookup table. Once the unique identification number has been identified within the index lookup table, the associated information with this number is then transmitted to the scanning device **460**. Once, the requested information has been received by the scanning device, it could be presented on a display that is connected to said scanning device **470**.

This system allows for the non-contact identification of an individual and retrieval of all information with respect to said individual. The individual's information is retrieved by and

displayed directly on a scanning device, thus the person requesting the detailed information is not required to leave the individual to be identified in order to locate the personal information, thereby increasing work efficiency.

EXAMPLES

EXAMPLE 1: THE USE OF THIS METHOD AND SYSTEM IN A HOSPITAL SETTING

Once a patient is admitted into a hospital they are assigned a RFID tag with a unique identification number, which is correlated with said patient's medical information contained within a clinical database.

A member of the hospital staff needs to determine the identity a patient that is, for example, sleeping or in a quarantined area, this system allows for the non-contact identification of said patient. In a hospital setting the transmission of viruses and fluids and the like, that could be on the surface of the identification tag, can be reduced with this type of non-contact identification procedure.

Upon scanning of the RFID tag, the magnetic field generated by the scanning device activates the passive RFID tag, resulting in the transmission of the unique identification number and possibly additional information to the scanning device, depending on the circuitry of the RFID tag. Once the scanning device has received the unique identification number, it can transmit said number to the clinical database contained within the hospital. Access to the clinical database could be through a wired hospital network (serving the patient/clinical database system) that is physically connected to the scanning device. However, a preferred alternative involves the use of a wireless connection between the scanning device and the hospital clinical database system, which would allow easy mobility of a scanning device from patient to patient. If this unique identification number, which was transmitted by the scanning device, is not recognised by the clinical database, then access to the information on said database is denied. If the unique identification number transmitted by the scanner is valid, it is then correlated with the particular patient's medical records using an index lookup table. This index lookup table would include a complete list of all unique identification numbers that have been issued and correlate this number with the patient's individual hospital identification number. This individual hospital record number would be the permanent identification number used for said patient, since the RFID tag number would be different on a subsequent hospital visit of the same patient. All information on a

patient is stored in the clinical data system and permits the scanning device to obtain such information (including, but not exclusively, the patient's name, hospital record number, date of birth, sex, medicare/health care insurance number, address, religion, lab results, radiological results, etc.). This information is then retrieved from the clinical database and subsequently transmitted to the scanning device that sent the original request. This information would then be displayed on the scanning device for the hospital staff to view. This method and system allows for the retrieval of patient information rapidly and without the need for the hospital staff to leave the location of the patient in question, thus increasing the efficiency and quality of the care of said patient.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A system for identifying and retrieving information about an individual comprising:
   a) a plurality of RFID tags, wherein each tag corresponds to one individual;
   b) a scanning device; and
   c) an information database

   wherein said identification of an individual is possible by non-contact means.

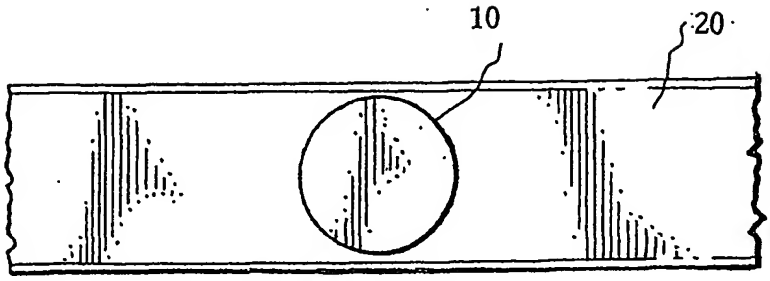

Figure 1

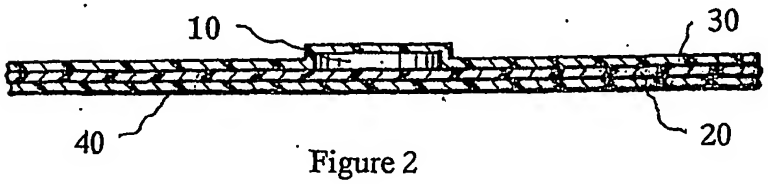

Figure 2

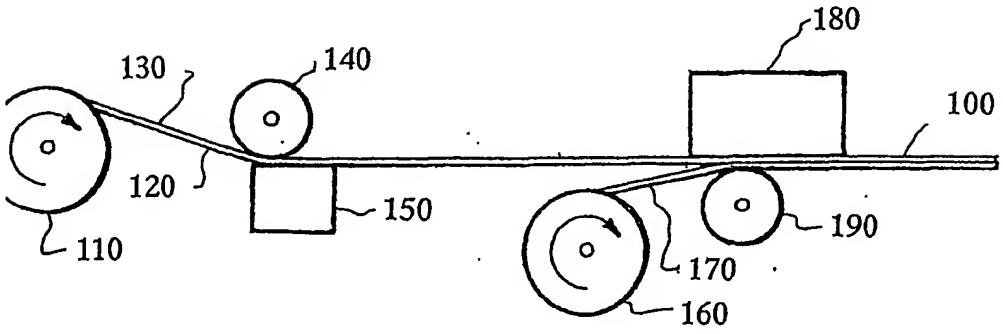

Figure 3

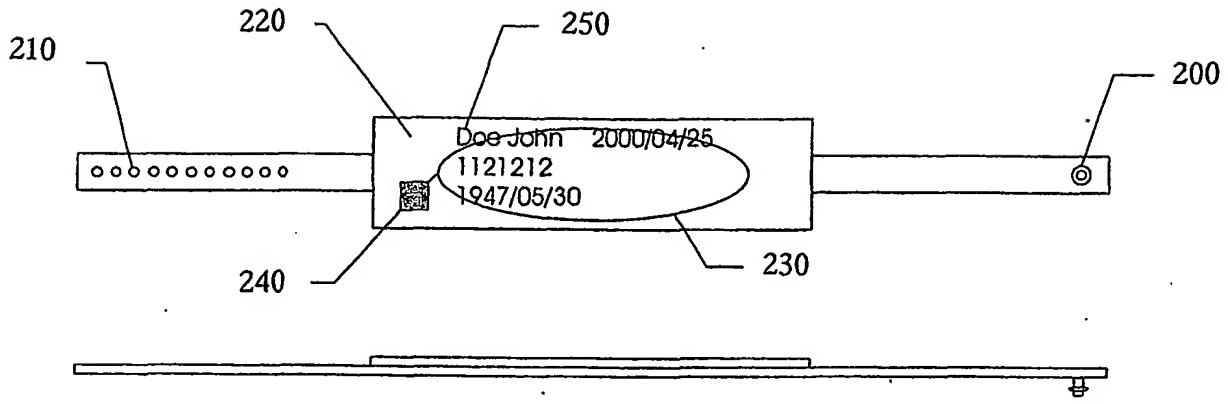

Figure 4

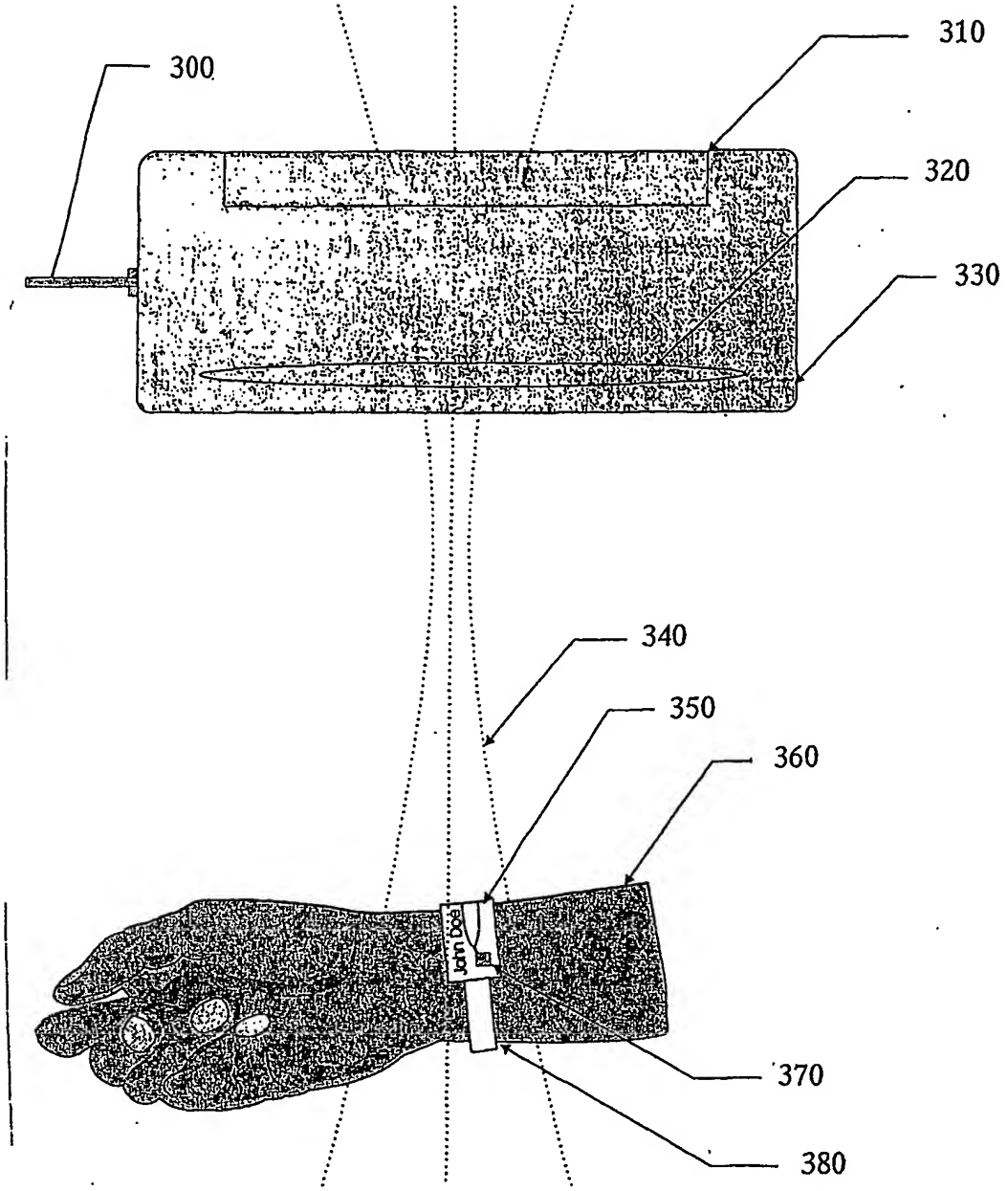

Figure 5

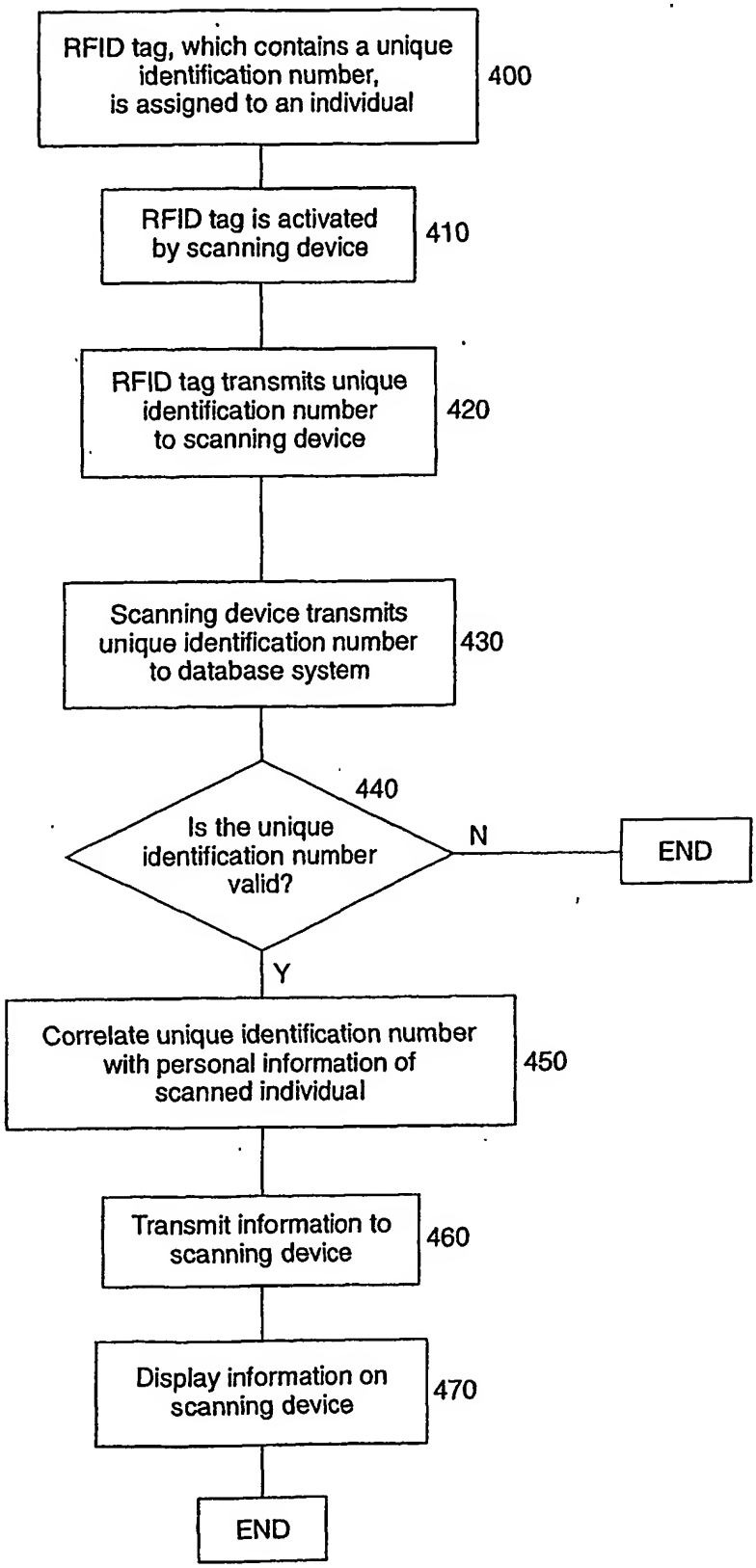
RFID tag, which contains a unique identification number, is assigned to an individual
400
RFID tag is activated by scanning device
410
RFID tag transmits unique identification number to scanning device
420
Scanning device transmits unique identification number to database system
430
440
Is the unique identification number valid?
N
END
Y
Correlate unique identification number with personal information of scanned individual
450
Transmit information to scanning device
460
Display information on scanning device
470
END

Figure 6

INTERNATIONAL SEARCH REPORT

Interr[redacted]nal Application No
PCT/CA 01/01606

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G06K7/00 A61B5/117

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G06K A61B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 00 55818 A (BROOKING TIMOTHY JOHN) 21 September 2000 (2000-09-21) claim 11; figures FIG.,4	1
X	WO 87 03119 A (PAL ENTERPRISES) 21 May 1987 (1987-05-21) page 17, line 4 -page 18, line 25	1
X	US 6 042 005 A (BASILE MARK R ET AL) 28 March 2000 (2000-03-28) column 4, line 4 - line 46; figure 1	1

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

° Special categories of cited documents :

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Date of the actual completion of the international search	Date of mailing of the international search report
5 March 2002	09/04/2002

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Fichter, U

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/CA 01/01606

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
WO 0055818	A	21-09-2000	AU	3305600 A	04-10-2000
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US 6042005	A	28-03-2000	NONE		